Rock ID by Fracture ID

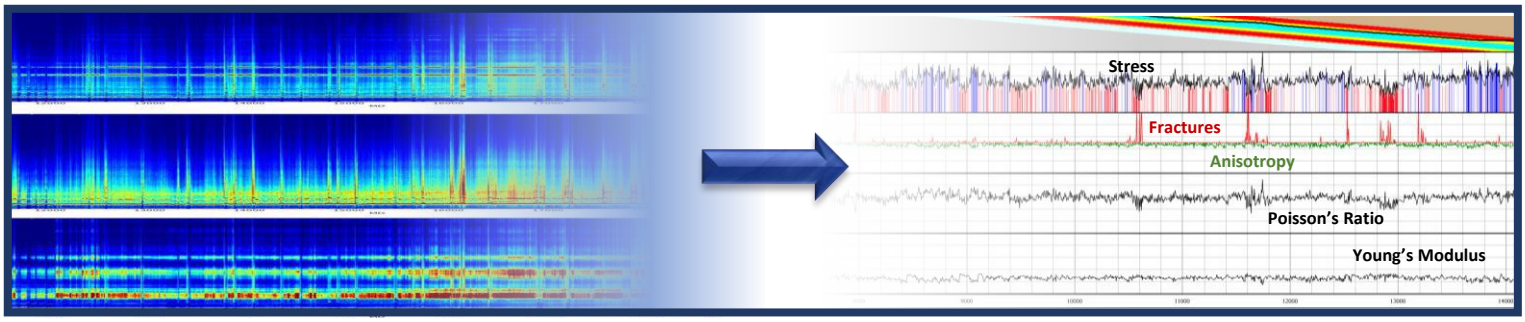
Making better decisions about your unconventional reservoir starts with understanding the rocks. Unfortunately, the acquisition of reliable, low cost formation data has proven to be a challenge—until now.

Rock ID is the unconventional solution to your unconventional challenges. Utilizing Drillbit Geomechanics™, Rock ID provides formation rock properties derived from at-bit measurements acquired while drilling. Whether it's understanding mineralogy or inter-well communication during completions, Rock ID is a cost-effective wireline alternative that can provide the data you need to make informed decisions.

Are your data up to the task?

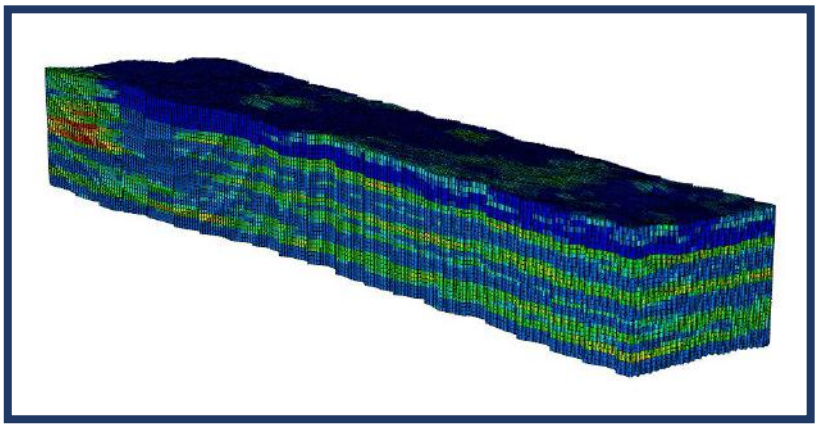
How Drillbit Geomechanics™ Works

A high-frequency, triaxial accelerometer is placed near the bit in the drilling assembly and records data in memory while drilling. After the run, the data are processed using a proprietary technique and are transformed from drilling vibrations to formation rock properties including Young's Modulus, Poisson's Ratio, Fractures, and Anisotropy.



Drilling vibrations (left) are used to determine formation rock properties (right).

How Rock ID Is Used



3D model of rock properties calibrated with horizontal well data from Rock ID.

Geomechanics data can be integrated and used in a variety of ways to decrease operational costs and increase production including:

- Mineralogy modeling
- Drilling analysis
- Completions design
- Geo-informed stages and perforations
- Trouble stage identification
- Fracture modeling
- 3D & 4D Reservoir modeling
- Geomodeling
- Data analytics

1-888-392-1628 • info@fractureid.com • 216 16th Street, Suite 1500, Denver, CO 80202

Rock ID Technical Bulletin

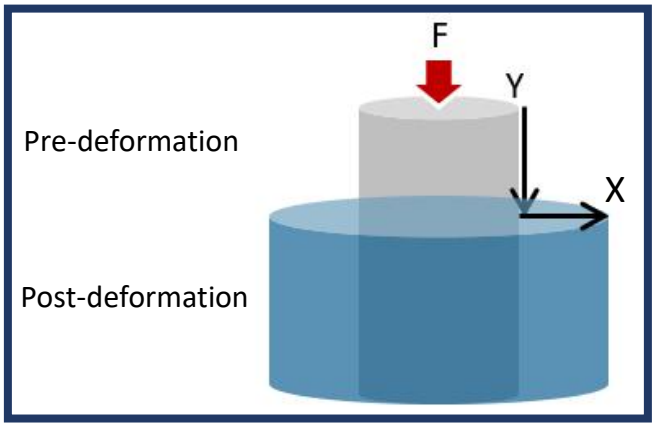
Data included in Rock ID:

Young's Modulus (YME) – Stress / Strain

- The amount of force (F) required to elastically compress a material by distance (Y).

Poisson's Ratio (PR) – Transverse Strain/Axial Strain

- The increase in width (X) compared to the reduction in length (Y) when elastically compressed.

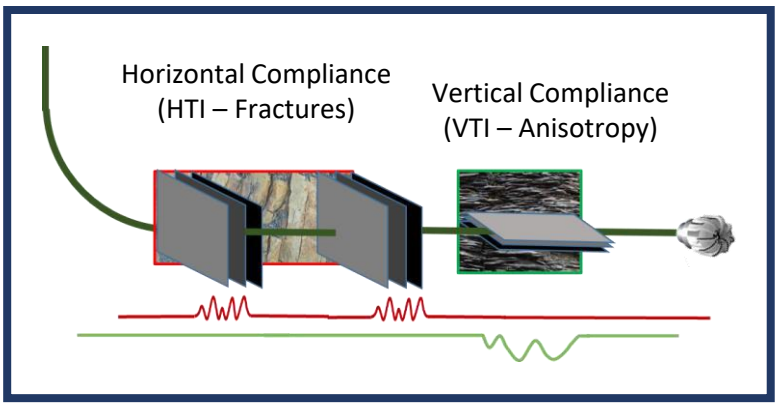


Anisotropy

- Relative indication of vertical transverse isotropy (VTI)

Fracture Compliance

- Relative indication of horizontal transverse isotropy (HTI)



Validation of Rock ID Properties:

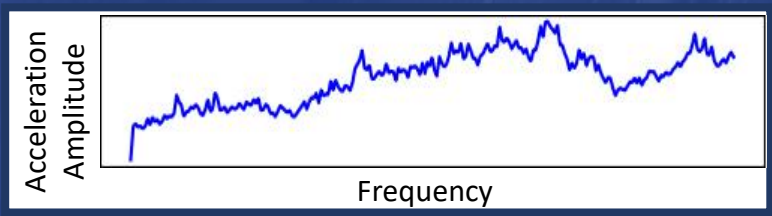
- Laboratory testing.
- Comparisons of mechanical rock properties calculated from sonic and density logs.
- Comparisons to various formation image tool results.
- Comparisons to core.
- Lookback studies.

The Science of Drillbit Geomechanics™:

A high-frequency, three-component accelerometer is placed in the drilling assembly near or in the bit.

Drilling assembly options for at-bit or behind motor configurations.

As the drill bit is deforming, breaking and crushing rock, the vibrations are recorded by the tool. The high-frequency data are processed using seismic source models to characterize the bit-rock interaction.



From there, linear-elastic models are used to transform the measured response into high resolution geomechanical logs.

$$\begin{bmatrix}\sigma_1\\ \sigma_2\\ \sigma_3\\ \sigma_4\\ \sigma_5\\ \sigma_6\end{bmatrix} = \begin{bmatrix}C_{11} & C_{12} & C_{12} & 0 & 0 & 0\\ C_{12} & C_{11} & C_{12} & 0 & 0 & 0\\ C_{12} & C_{12} & C_{11} & 0 & 0 & 0\\ 0 & 0 & 0 & C_{66} & 0 & 0\\ 0 & 0 & 0 & 0 & C_{66} & 0\\ 0 & 0 & 0 & 0 & 0 & C_{66}\end{bmatrix}\begin{bmatrix}e_1\\ e_2\\ e_3\\ e_4\\ e_5\\ e_6\end{bmatrix}$$

ROCK ID

For more information visit us at www.fractureid.com

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